

## CLAIMS

- 1) A polarized light optical illumination device comprising a light source (1) emitting a first light beam (10), characterized in that it comprises: a Fresnel-Rhomb type optical polarization device (3) receiving, via an input face (30), the first light beam (10) which is reflected at least twice by at least two opposite faces (35, 36) of said optical polarization device and supplying, via an output face (31), at least a second beam; a reflective polarizer (6) positioned facing the output face (31) of the Fresnel-Rhomb polarization device to receive the second light beam so as to allow the linearly polarized light to pass in a first direction and to reflect light presenting any other polarization; a reflection device (44) positioned between the input face (30) of the polarization device (3) and the light source (1) so as to allow said first light beam (10) to pass but to reflect the light returned by the reflective polarizer (6).
- 2) The optical illumination device as claimed in either of claims 1 or 2, characterized in that it comprises:
- a first optical guide (4) having an input face (41) designed to receive said first light beam (10), an output face pressed (42) against the input face (30) of the Fresnel-Rhomb polarization device (3) with its optical axis (40) perpendicular to said input face (30), the cross section of this first guide being



roughly of the same dimensions as the surface of said input face (30) of the Fresnel-Rhomb polarization device (3),

- and a second optical guide (5) having an input face (51) pressed against the output face (31) of the Fresnel-Rhomb polarization device (3) and an output face emitting towards the reflective polarizer (6) light received from the source (1), the optical axis (50) of the second optical guide being perpendicular to the output face (31) of the Fresnel-Rhomb polarization device (3), and the cross section of this second guide being roughly of the same dimensions as the surface of said output face (31) of the Fresnel-Rhomb polarization device.

3) The optical illumination device as claimed in claim 2, characterized in that either or both of the optical guides operate as light integrators.

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4) The optical illumination device as claimed in claim 1, characterized in that the output face (31) of the Fresnel-Rhomb optical polarization device (3) has a shape similar to that of a surface intended to be illuminated by said illumination device.

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5) The optical illumination device as claimed in one of claims 2, 3 or 4, characterized in that since the Fresnel-Rhomb polarization device has a rectangular or square cross section, said optical guides have rectangular or square cross sections.

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- 6) The optical illumination device as claimed in claim 2, characterized in that the reflective polarizer (6) is positioned facing the output face (52) of the second guide (5).
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- 7) The optical illumination device as claimed in either of claims 1 or 2, characterized in that the reflective polarizer (6) is oriented approximately at  $45^\circ$  relative to said opposite faces (35, 36) of said optical polarization device (3).
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- 8) The optical illumination device as claimed in either of claims 1 or 2, characterized in that the reflection device (44) is located on the input face (30) of the Fresnel-Rhomb polarization device (3) or on the input face (41) of the first optical guide (4).
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- 9) The optical illumination device as claimed in claim 8, characterized in that the reflection device (44) includes a layer of a reflective material including a non-reflecting area (43) to allow the passage of said first light beam (10).
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- 10) The optical illumination device as claimed in either of claims 1 or 2, characterized in that said two or more opposite faces (35, 36) of the optical polarization device (3) induce on a light beam a total phase shift of  $90^\circ$  between the S and P polarization components of said beam.
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- 11) The optical illumination device as claimed in claim 10, characterized in that both said opposite faces (35, 36) of the optical polarization device (3) are parallel.
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- 12) The optical illumination device as claimed in any one of the preceding claims, characterized in that the light source (1) includes a reflector (12) lit by a light source (11) and focusing the light in the
- 10 Fresnel-Rhomb polarization device (3).
- 13) The optical illumination device as claimed in claim 2, characterized in that the axis of the first light beam (10) coincides with the optical axis of the first
- 15 optical guide (4).
- 14) The optical illumination device as claimed in one of claims 1, 2 or 11, characterized in that said first light beam is not collimated.
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- 15) The optical illumination device as claimed in claim 12, characterized in that said first light beam (10) is convergent.
- 25 16) The optical illumination device as claimed in any one of the preceding claims, characterized in that it includes a display device (2) located facing the reflective polarizer (6) so as to be lit by the light transmitted by this reflective polarizer.



- 17) The optical illumination device as claimed in claim 13, characterized in that said display device is a liquid crystal modulator.